REMARKS

Prior to entry of this amendment claims 1-29 were pending, with claims 7-25 being withdrawn from examination. This amendment adds new claims 30-33.

The Amendments to the Specificaton

The paragraph spanning pages 15-16 has been amended to correct a clerical error by replacing "in least in part" with "at least in part". This amendment is believed to be supported by the description at page 16, lines 1-6 of the application as filed.

The first full paragraph of page 16 has been amended to correct a clerical error by replacing the sentence: "The 3D features may remain on the photomask after the photomask is removed **are** be transferred to the polymeric layer" with "The 3D features may remain on the photomask after the photomask is removed **or** be transferred to the polymeric layer" (emphasis added). Applicants note that Figure 3 of the specification as filed illustrates use of a photomask with a 3D surface to form a sloped polymeric layer without transferring the 3D feature from the photomask to the polymeric layer (see also description at page 15, lines 1-4). Page 20, lines 19-24 describes transfer of features from the contact side of the mask to a device.

The second full paragraph of page 19 has been amended to correct a clerical error by replacing the sentence: "Any excess sacrificial material deposited onto surfaces where attachment of the subsequent layer can be solvent polished before fabrication of the subsequent layer." with "Any excess sacrificial material deposited onto surfaces where attachment of the subsequent layer will occur can be solvent polished before fabrication of the subsequent layer." This amendment is believed to improve the clarity of the sentence and to be supported by original claim 13 and the description of attachment of the fabricated polymeric layers to each other which is present earlier in the amended paragraph.

The paragraph spanning pages 22 and 23 has been amended at line 1 of page 23 to correct a clerical error. The phrase "which case" has been corrected to "in which case."

The first full paragraph of page 26 has been amended to correct a clerical error in line 8, thereby specifying that an LVDT height measurement sensor was also added.

It is believed that no new matter has been added by these amendments.

The Amendments to the Claims

Claim 1 has been amended to specify that a previously fabricated polymeric layer serves at least in part as the substrate. This amendment is believed to be supported at page 16, lines 1-6. Claim 1 has also been amended to specify that the previously fabricated polymeric layer has surface iniferter precursor groups. This amendment is believed to be supported by Figure 2 and the description at 12, lines 19-28 and page 13, lines 13 and 19-25. Step a) has also been amended to incorporate the limitation of claim 5, specifying that the liquid comprising the polymer precursor also comprises an iniferter or an iniferter precursor. Step b) has also been amended to specify that iniferter or iniferter precursor is activated by exposure to light to initiate polymerization of the liquid layer. This amendment is believed to be supported the description at page 12, lines 1-4 of the specification as filed.

Claims 4 and 6 have been amended to specify that the photoinitiator is other than an iniferter or iniferter precursor, and that the rate of surface initiation is rapid enough relative to bulk polymerization to generate covalent linkages to the previous layer prior to complete curing of the new layer. These amendments are believed to be supported by the description at page 13 lines 20-25 and Example 2.

Claim 5 has been amended to recite that the polymer precursor is a multivinyl monomer. This amendment is believed to be supported by the description at page 13, lines 21-22 of the specification as filed.

Claim 26 has been rewritten in independent form to include the limitations of the prior version of claim 5, from which it depended. Claim 26 has also been amended to specify that the first and second iniferter or iniferter precursor are activated by light to initiate

polymerization of the liquid layer, which is believed to be supported by the description at page 12, lines 1-4 of the specification.

New claim 30 specifies that the second liquid further comprises a photoinitiator other than an iniferter or iniferter precursor, and that the rate of surface initiation is rapid enough relative to bulk polymerization to generate covalent linkages to the previous layer prior to complete curing of the new layer. These amendments are believed to be supported by the description at page 13 lines 20-25 and Example 2.

New claim 31 specifies that the second photopolymerizable polymer precursor is a multivinyl monomer. This limitation is believed to be supported at page 13, lines 21-22 of the specification as filed.

New claim 32 specifies that the first and second layers are crosslinked. This limitation is believed to be supported at page 13, lines 19-23 of the specification as filed.

New claim 33 specifies that the first and second polymerizable precursors are the same. This limitation is believed to be supported by Example 2, page 28 line 12 through page 29 line 4.

No new matter is believed to have been added by these amendments.

The Objections to the Specification

The Office Action objected to informalities in the specification at page 16, line 1, page 16, line 25, page 19 lines 19-21, page 23, line 1 and page 26 lines 8-9. The objections are believed to be obviated by the requested amendments to the specification. Applicants respectfully request withdrawal of the objections.

The 35 U.S.C. 102(b) Rejections

Ward et al.

Claims 1-2 and 4-6 were rejected under 35 U.S.C. 102(b) as being anticipated by Ward et al. ("UV free-radical polymerization for micropatterning poly(ethylene glycol)-containing films," Proceedings of the SPIE, Complex Mediums, 4097, 221-228, 30 July-1 Aug. 2000, hereinafter Ward).

Amended claim 1 relates to formation of a layer of a liquid comprising a photopolymerizable polymer precursor and an iniferter or an iniferter precursor between the substrate and an at least partially transparent element, wherein a previously fabricated polymeric layer having surface iniferter precursor groups serves at least in part as the substrate. The layer of liquid is subsequently polymerized by exposure to light capable of activating the iniferter or iniferter precursor. Incorporation of iniferter or iniferter precursor in the liquid layer in addition to the iniferter groups present at the surface of the substrate has several benefits. Incorporation of an iniferter or iniferter precursor in the liquid layer results in a polymeric layer containing reinitiatable chemical groups at the surface (page 12, lines 21-22 and page 21, lines 8-11). The use of an iniferter or iniferter precursor in the liquid layer therefore allows adhesion between the polymerized layer and a subsequent layer (as described at page 13, lines 19-20 and page 21, lines 23-28). Incorporation of additional iniferter or iniferter precursor in the liquid layer also provides an additional way to control the polymerization rate of the layer and the number of reinitiatable groups formed.

Applicants respectfully assert that Ward does not teach formation of a layer of a liquid comprising a photopolymerizable polymer precursor and an iniferter or an iniferter precursor between a previously fabricated polymeric layer having surface iniferter precursor groups and an at least partially transparent element prior to activation of the surface iniferter or iniferter precursor groups by exposure of the layer to light. Instead, pages 222-224 of Ward describes formation of a layer of monomer B (which does not contain additional TED) on a film of polymer A followed by exposure to UV light. Page

222 of the reference teaches that upon irradiation of polymer A in the presence of monomer B, thiol-terminated polymer chains of polymer A will break down and the propagating polymer chain will react with monomer B. Therefore, the thiol-terminated polymer chains at the surface of Monomer A provide the only initial source of radicals for polymerization of monomer B. The other experiments described in the Ward reference also do not appear to contain all the elements of amended claim 1. Therefore, Ward does not teach all the limitations of amended claim 1. Reconsideration and withdrawal of the rejection of claim 1 is respectfully requested.

Claims 2 and 4-6 depend from and incorporate all the limitations of claim 1. In addition, amended claims 4 and 6 specify that the liquid further comprises a photoinitiator other than an iniferter or iniferter precursor, and that the rate of surface initiation is rapid enough relative to bulk polymerization to generate covalent linkages to the previous layer prior to complete curing of the new layer. Incorporation of additional photoinitiator in the liquid layer still allows generation of reinitiatable groups but also allows independent control of the polymerization rate of the layer and the number of reinitiatable groups. Applicants respectfully submit that the Ward reference does not teach incorporation of both an iniferter or iniferter precursor and a photoinitiator other than an iniferter or iniferter precursor in the liquid used to form subsequent layers. In view of all the foregoing, withdrawal of the rejections of claims 2 and 4-6 is also requested.

The 35 U.S.C. 103 Rejections

Ward in view of Mancini et al.

Claim 3 was rejected under 35 U.S.C. 103(a) as being unpatentable over Ward in view of Mancini et al. (US 6,387,787, hereinafter Mancini). Applicants respectfully assert that the combination of the Ward and Mancini references does not teach all the limitations of claim 3, which depends and incorporates all the limitations of amended claim 1. In particular, the combination of the Ward and Mancini references fails to teach formation of a layer of a liquid comprising a photopolymerizable polymer precursor and an iniferter or an iniferter precursor between a previously fabricated polymeric layer

having surface iniferter precursor groups and an at least partially transparent element prior to activation of the iniferter or iniferter precursor by exposure of the layer to light. Applicants respectfully request reconsideration and withdrawal of the rejection of claim 3.

Ward in view of Fudim

Claims 26 and 27 were rejected under 35 U.S.C. 103(a) as being unpatentable over Ward in view of Fudim (WO 88/06494). The Office Action states that it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Fudim with those of Ward et al. for the benefit of adding additional layers to enlarge a formed object as suggested by Fudim.

Applicants respectfully assert that the combination of the Ward and Fudim references does not teach all the limitations of claim 26. In particular, the suggested combination of the Ward and Fudim references fails to teach formation of a layer of a second liquid comprising a photopolymerizable polymer precursor and a second iniferter or an iniferter precursor between a previously fabricated polymeric layer having surface iniferter precursor groups and an at least partially transparent element prior to activation of the second iniferter or iniferter precursor by exposure of the layer to light. As previously discussed, the teaching of Ward is that the layer of the second liquid does not contain any iniferter or iniferter precursor prior to irradiation of the layer. Applicants note that the Fudim reference does not relate to use of iniferters or iniferter precursors in the liquid photopolymer, instead relying on selection of the film used to cover the top surface of the liquid photopolymer to achieve covalent bonding between layers (col. 3, lines 12-18). Therefore, Applicants respectfully request reconsideration and withdrawal of the rejection of claim 26. Since claim 27 depends from and incorporates all the limitations of claim 26, reconsideration and withdrawal of the rejection of claim 27 is requested.

Ward in view of Fudim and further in view of Pomerantz et al.

Claims 28 and 29 were rejected under 35 U.S.C. 103(a) as being unpatentable over Ward in view of Pomerantz et al. (EP 0322257, hereinafter Pomerantz). The Office Action states that it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Pomerantz with those of Ward et al/Fudim for the benefit of enabling complex or hollow objects to be formed as suggested by Pomerantz (col. 87 lines 26-27).

Applicants respectfully assert that the combination of the Ward, Fudim and Pomerantz references does not teach all the limitations of claim 28. In particular, the suggested combination of the Ward and Fudim references fails to teach formation of a layer of a second liquid comprising a photopolymerizable polymer precursor and a second iniferter or an iniferter precursor between a previously fabricated polymeric layer having surface iniferter precursor groups and an at least partially transparent element prior to activation of the second iniferter or iniferter precursor by exposure of the layer to light. As previously discussed, the teaching of Ward is that the layer of the second liquid does not contain any iniferter or iniferter precursor prior to irradiation of the layer. Applicants note that the Fudim reference does not relate to use of iniferters or iniferter precursors, instead relying on selection of the film used to cover the top surface of the liquid photopolymer to achieve covalent bonding between layers may be achieved through (col. 2, lines 12-18). The Pomerantz reference also does not relate to use of iniferters or iniferter precursors, instead teaching use of a residual resin solidification technique (col. 15, lines 26-30) or mechanical machining to roughen the surface (col. 15, lines 42-45) in order to improve adhesion between layers. Therefore, Applicants respectfully request reconsideration and withdrawal of the rejection of claim 28. Since claim 29 depends from and incorporates all the limitations of claim 28, reconsideration and withdrawal of the rejection of claim 29 is requested.

The New Claims

Claim 30 depends from and incorporates all the limitations of claim 26, which is believed to be in condition for allowance. In addition, claim 30 specifies that the second

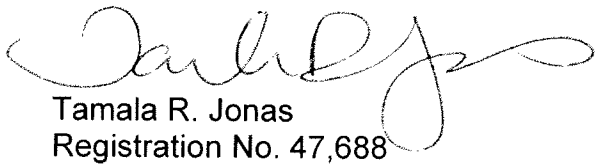
liquid further comprises a photoinitiator other than an iniferter or iniferter precursor, and the rate of surface initiation is rapid enough relative to bulk polymerization to generate covalent linkages to the previous layer prior to complete curing of the new layer. This additional limitation of claim 30 is not believed to be taught or suggested by the cited references, either singly or in combination. Claims 31-33 depend from and incorporate all the limitations of claim 30, which is believed to be in condition for allowance.

Conclusion

All claims being in condition for allowance, passage to issuance is respectfully requested.

It is believed that fees for the addition of one independent claim ($110) four dependent claims ($104) and a three-month extension of time ($555) are due with this submission. Therefore, it is intended that payment in the amount of $769 will be made via the Electronic Filing System with this submission. If the amount submitted is incorrect or if any additional fees or further extensions of time are required, please deduct the appropriate fees required for this submission from or credit any overpayment to Deposit Account No. 07-1969.

Respectfully submitted,



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